AMENDMENTS TO THE CLAIMS:

Please cancel claims 22-83 without prejudice or disclaimer and amend the claims as follows:

1. (Original) A semiconductor device comprising at least one tailored index single mode optical amplifier.

2. (Original) The semiconductor device as recited in claim 1, wherein the tailored index is produced by tailoring a current profile applied to the optical amplifier.

3. (Original) The semiconductor device as recited in claim 2, wherein the current profile is tailored along the optical axis of the optical amplifier.

4. (Original) The semiconductor device as recited in claim 2, wherein the current profile is tailored along at least two of the axes of the optical amplifier.

5. (Original) The semiconductor device as recited in claim 1, further comprising a heat sink, wherein the tailored index associated with the optical amplifier is produced by varying the thermal impedance characteristic of the junction at the heatsink.

6. (Original) The semiconductor device as recited in claim 1, wherein the tailored index associated with the optical amplifier is provided by implantation of impurities in regions of the semiconductor device adjacent to the optical amplifier.

7. (Original) The semiconductor device as recited in claim 1, wherein the tailored index associated with the optical amplifier is produced by varying the height of a buried rib along the optical axis as the width varies from a first to a second predetermined value.

8. (Original) The semiconductor device as recited in claim 1, wherein the tailored index associated with the optical amplifier is produced by varying the height of a surface rib along the optical axis as the width varies from a first to a second predetermined value.

9. (Original) The semiconductor device as recited in claim 1, wherein the tailored index associated with the optical amplifier is produced by varying at least two of:

a current profile applied to the optical amplifier;

the thermal impedance characteristic of a junction between the optical amplifier and a heatsink thermally coupled thereto;

impurity densities in regions of the semiconductor device adjacent to the optical amplifier;

the height of a buried rib along the optical axis as the width varies from a first to a second predetermined value; and

the height of a surface rib along the optical axis as the width varies from a first to a second predetermined value.

10. (Original) A semiconductor device comprising:

at least one tailored index single mode optical amplifier;

an input waveguide for coupling an optical signal into the optical amplifier; and

an output waveguide for coupling an amplified signal out of the optical amplifier.

11. (Original) The semiconductor device as recited in claim 10, wherein the output waveguide comprises an optical element for extracting the amplified signal out of a surface parallel to the optical axis of the optical amplifier.

12. (Original) The semiconductor device as recited in claim 11, wherein the optical element comprises a turning mirror.

13. (Original) The semiconductor device as recited in claim 11, wherein the optical element comprises a diffraction grating.

14. (Original) The semiconductor device as recited in claim 10, wherein the input waveguide comprises a tailored index waveguide.

15. (Original) The semiconductor device as recited in claim 10, wherein the input waveguide comprises a tapered waveguide.

16. (Original) The semiconductor device as recited in claim 10, wherein: the semiconductor device comprises epitaxial layers; and

at least one of the input and output waveguides couples one of the optical signal and the amplified signal at a boundary plane of the optical amplifier intersecting the epitaxial layers.

17. (Original) The semiconductor device as recited in claim 16, wherein the boundary plane is not perpendicular to the optical axis of the optical amplifier.

18. (Original) A semiconductor device comprising:

a tailored index single mode optical amplifier including means for tailoring a structural characteristic associated with the optical amplifier to thereby provide the tailored index;

first coupling means for coupling an optical signal into the optical amplifier; and

second coupling means for coupling an amplified signal out of the optical amplifier.

19. (Original) The semiconductor device as recited in claim 18, wherein at least one of the first and second coupling means comprises an optical fiber.

20. (Original) The semiconductor device as recited in claim 18, wherein at least one of the first and second coupling means comprises a free space optical path portion.

21. (Original) The semiconductor device as recited in claim 18, wherein at least one of the first and second coupling means comprises a phase modulator.

22.-83. (Canceled)

Please add the following new claims:

84. (New) A semiconductor device comprising:

an optical phased array having N output amplifiers,

wherein each of the output amplifiers comprises a tailored index single mode amplifier, the N output amplifiers are disposed on a single substrate, and N is an integer equal to or greater than 2.

85. (New) The semiconductor device as recited in claim 84, wherein the N tailored index single mode output amplifiers are disposed in a linear array.

86. (New) The semiconductor device as recited in claim 85, wherein at least one of the input and output regions of the semiconductor device associated with the linear array corresponds to a facet of the semiconductor device exposing the epitaxial layers of the semiconductor device.

87. (New) The semiconductor device as recited in claim 84, wherein the N tailored index single mode output amplifiers are disposed in a two-dimensional planar array.

88. (New) The semiconductor device as recited in claim 87, wherein the semiconductor device further comprises coupling elements for coupling optical signals one of into and out of the surface of the semiconductor device.

89. (New) The semiconductor device as recited in claim 84, wherein each of the N optical amplifiers is optically coupled to one of a surface emitter or a receptor disposed on a layer of the semiconductor device.

90. (New) A semiconductor device comprising:

a distribution network receiving an optical source signal and generating N distributed signals;

N-1 phase modulators receiving N-1 of the N distributed signals and generating N-1 phase modulated signals;

an optical phased array having N output amplifiers, each of the N optical amplifiers receiving one of the N-1 phase modulated signals or the N distributed signals,

wherein each of the output amplifiers comprises a tailored index single mode amplifier,

wherein the N output amplifiers, the N-1 phase modulators, and the distribution network are disposed on a single substrate, and

wherein N is an integer equal to or greater than 2.

91. (New) The semiconductor device as recited in claim 90, wherein the N tailored index single mode output amplifiers are disposed in a linear array.

92. (New) The semiconductor device as recited in claim 91, wherein at least one of the input and output regions of the semiconductor device associated with the linear array corresponds to a facet of the semiconductor device exposing the epitaxial layers of the semiconductor device.

93. (New) The semiconductor device as recited in claim 90, wherein each of the N-1 phase modulators increases the collimation of the individual optical outputs of N-1 of the N output amplifiers.

94. (New) The semiconductor device as recited in claim 90, wherein the N-1 phase modulators collectively improve the geometric fill factor of the combined optical outputs of the N output amplifiers.

95. (New) The semiconductor device as recited in claim 90, wherein the N tailored index single mode output amplifiers are disposed in a two-dimensional planar array.

96. (New) The semiconductor device as recited in claim 95, wherein the semiconductor device further comprises coupling elements for coupling optical signals one of into and out of the surface of the semiconductor device.

97. (New) The semiconductor device as recited in claim 95, wherein each of the N optical amplifiers is optically coupled to one of a surface emitter or a receptor disposed on a layer of the semiconductor device.

98. (New) The semiconductor device as recited in claim 95, wherein each of the N-1 phase modulators increases the collimation of the individual optical outputs of N-1 of the N output amplifiers.

99. (New) The semiconductor device as recited in claim 90, wherein the N-1 phase modulators collectively improve the geometric fill factor of the combined optical outputs of the N output amplifiers.

100. (New) A semiconductor device comprising:

a master oscillator generating an optical source signal;

a distribution network receiving the optical source signal and generating N distributed signals;

N-1 phase modulators receiving N-1 of the N distributed signals and generating N-1 phase modulated signals;

an optical phased array having N output amplifiers, each of the N optical amplifiers receiving one of the N-1 phase modulated signals or the N distributed signals,

wherein each of the output amplifiers comprises a tailored index single mode amplifier,

wherein the N output amplifiers, the N-1 phase modulators, the distribution network, and the master oscillator are all disposed on a single substrate, and

wherein N is an integer equal to or greater than 2.

101. (New) The semiconductor device as recited in claim 100, wherein the N tailored index single mode output amplifiers are disposed in a linear array.

102. (New) The semiconductor device as recited in claim 101, wherein at least one of the input and output regions of the semiconductor device associated with the linear array corresponds to a facet of the semiconductor device exposing the epitaxial layers of the semiconductor device.

103. (New) The semiconductor device as recited in claim 100, wherein each of the N-1 phase modulators increases the collimation of the individual optical outputs of N-1 of the N output amplifiers.

104. (New) The semiconductor device as recited in claim 100, wherein the N-1 phase modulators collectively improve the geometric fill factor of the combined optical outputs of the N output amplifiers.

105. (New) The semiconductor device as recited in claim 100, wherein the N tailored index single mode output amplifiers are disposed in a two-dimensional planar array.

106. (New) The semiconductor device as recited in claim 105, wherein the semiconductor device further comprises coupling elements for coupling optical signals one of into and out of the surface of the semiconductor device.

107. (New) The semiconductor device as recited in claim 105, wherein each of the N optical amplifiers is optically coupled to one of a surface emitter or a receptor disposed on a layer of the semiconductor device.

108. (New) The semiconductor device as recited in claim 105, wherein each of the N-1 phase modulators increases the collimation of the individual optical outputs of N-1 of the N output amplifiers.

109. (New) The semiconductor device as recited in claim 100, wherein the N-1 phase modulators collectively improve the geometric fill factor of the combined optical outputs of the N output amplifiers.